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News and notes should be sent to Dana Barbour, News Editor, American Statistical Association, 1757 K Street, N.W., Washington 6, D. C.

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NEWS

Annual Meeting Arrangements—Weiss Memorial Fund Authorized—Meetings Summer Courses—New Publications

Arrangements for Detroit Annual Meeting

Plans for the program for the 1956 meeting to be held at the Sheraton-Cadillac Hotel, September 7–10, are nearly complete. These plans have been developed under the chairmanship of Conrad Taeuber, Bureau of the Census. The program will appear in the June issue of *The American Statistician* A general mailing of forms and information will be sent to all members of the Association in advance of the meeting. Plans for local arrangements are also under way.

The Committee on Local Arrangements is as follows:

Local Arrangements Committee

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Chairman: Leo Katz, Dept. of Mathematics, Michigan State University, East Lansing, Michigan

Vice-Chairman: Leslie Kish, Survey Research Center, University of Michigan, Ann Arbor, Michigan

Committee Formed to Raise Funds for Scholarship as a Memorial to Samuel Weiss

President Gertrude M. Cox has appointed Lester R. Frankel as chairman of the Samuel Weiss Memorial Committee. The purpose of this committee is to raise funds for a student aid-scholarship fund to be named as a memorial to Mr. Weiss, who was Executive Director of ASA for several years and, also, was Chief Statistician of the Bureau of Labor Statistics. Mr. Weiss died last year. The fund will be administered at the university level.

Mr. Frankel, who is Vice-President and Technical Director of Alfred Politz Research, Inc., has appointed a steering committee of the following members besides himself:

A. J. Jaffe, Bureau of Applied Social Research, Columbia University

Dr. Meredith B. Givens, New York State Department of Labor

Robert E. Johnson, Economist and Actuary, Western Electric Company

Lazare Teper, Director of Research, International Ladies' Garment Workers Union

Raymond T. Bowman, Director, Office of Statistical Standards, Bureau of the Budget

Mr. Frankel stated that the Memorial Committee will eventually include approximately 35 members.

Chapter Liaison Officers Appointed by SPES

The Section on Physical and Engineering Sciences has appointed a liaison officer for each ASA chapter. In general, the responsibilities of these officers are to stimulate physical science programs both in the chapter itself and at local meetings of technical societies such as the American Society for Quality Control, Chemical, Engineering, etc.; help provide speakers for such programs; encourage affiliation with SPES on the part of individual ASA members; and work with the Panel Chairman of SPES. Thus the contributions to ASA should be in two directions, locally and Association-wide. The response to this effort has been very gratifying both from the nominees and the chapter presidents.

The Section on Business and Economic Statistics is also concerned about working out closer liaison between the Section and the various ASA chapters, particularly those with a strong B. and E. Section membership.

Summer Offerings in Statistics at Iowa State College

The 1956 summer offerings of the Department of Statistics at Iowa State College will be given in two sessions: June 11–July 18 and July 18–August 24. Students may register for either six-week session or for the full 12-week summer quarter. The offerings include six courses at the advanced undergraduate and graduate minor level and are designed to satisfy background requirements for graduate major work in statistics. Senior members of the staff will be available during most of the summer for consultation on graduate research and special problems courses. The complete program consists of Stat. 401 and 402, "Statistical Methods for Research Workers," offered in sequence; Stat. 447 and 448, "Statistical Theory for Research Workers," offered in sequence; Stat. 411, "Experimental Designs for Research Workers," and Stat. 421, "Survey Designs for Research Workers," both given in the second session; Stat. 599, "Special Problems," and Stat. 699, "Research, " both elective either session. Additional information may be obtained from T. A. Bancroft, Director, Statistical Laboratory, Iowa State College.

Summer Sessions at Berkeley, California

The 1956 summer program in the Department of Statistics of the University of California, Berkeley, California, will consist of two sessions: June 18 to July 28 and July 30 to September 8. The faculty of the summer sessions will include Professor D. R. Cox of the University of North Carolina, Professor Grace E. Bates of Mount Holyoke College, and Professor David Blackwell and Mr. T. S. Ferguson of the Department of Statistics of the University of California.

The program includes two of the usual undergraduate courses in each session, adapted primarily to meet the needs of students transferring from other centers who would like to undertake advanced study at the University of California during the regular academic year. Also a graduate seminar will be conducted by Professor Blackwell. This seminar will allow for individual consultation for students working toward higher degrees.

Consumer Expenditures Study

The Wharton School of the University of Pennsylvania announces the forthcoming publication of a series of volumes of statistical data and research studies based in large part on the survey of consumer expenditures, savings and incomes in 1950 and 1951 conducted by the Bureau of Labor Statistics of the United States Department of Labor. These data represent the most comprehensive information on consumers' economic behavior available and virtually the only detailed information on the pattern of consumer expenditures in the United States in the period after World War II. This project is being carried out under a grant from The Ford Foundation.

These materials will provide new insights into the purchasing patterns of families and individuals in each of 91 cities as well as for urban United States as a whole, indicating the commodities purchased, prices paid, level of inventories, amounts spent and economic, social, demographic and other characteristics of the consuming units. Expenditures data will be classified by 21 family characteristics (income, etc.) and combinations of characteristics. The basic tabulations will be available by some classifications (and cross-classifications) for the first time, while other classifications which have been published in earlier studies will generally be shown in much greater detail.

There will be two sets of volumes: first, tabulations of expenditures and related data for 1950 and 1951 compiled by the Bureau of Labor Statistics from detailed surveys covering 1,500 items of budget information collected from each of 12,500 families and individuals in all income and occupational classes. The basic tabulations will cover approximately 8,000 pages and require eighteen volumes for publication. These volumes will be released from May, 1956 through the summer of the year.

Second, a series of research studies of economic and social aspects of consumption and saving patterns by staff members of the Wharton School and other academic institutions will be published over the next two years making use of the new 1950 and 1951 data, as well as of other consumer surveys and time series materials. Any questions concerning either the contents or the acquisition of these volumes should be addressed to: Consumer Expenditures Study, Wharton School of Finance and Commerce, Philadelphia 4, Pennsylvania.

Cooperative Graduate Summer Sessions in Statistics

The University of Florida, North Carolina State College, Virginia Polytechnic Institute and the Southern Regional Education Board are jointly sponsoring a series of cooperative summer sessions in statistics. This is the third of these summer sessions. It will be held this year at North Carolina State College, June 11–July 20, 1956. A session is scheduled to be held at Virginia Polytechnic Institute in 1957 and at the University of Florida in 1958. Each summer session lasts six weeks and each course carries approximately three semester hours of graduate credit.

The 1956 session will be held jointly with the Institute in Quantitative Research Methods in Agricultural Economics, sponsored by the Social Science Research Council. Several statistics courses will be oriented towards economic applications.

The combined faculty for the 1956 summer session and Institute at North Carolina State College will include: Professor R. L. Anderson, North Carolina State College; Professor Gertrude M. Cox, North Carolina State College; Professor David B. Duncan, University of Florida; Professor Alva L. Finkner, North Carolina State College; Dr. Arnold H. E. Grandage, North Carolina State College; Professor Robert J. Hader, North Carolina State College; Assistant Professor Cleon Harrell, North Carolina State College; Professor Earl O. Heady, Iowa State College; Professor Clifford G. Hildreth, Michigan State University; Professor Jack Levine, North Carolina State College; Professor Robert J. Monroe, North Carolina State College; and Assistant Professor Walter L. Smith, University of North Carolina.

Courses to be offered this summer are: Statistical Methods I, Statistical Methods II (Design of Experiments), Statistical Theory I (Probability and Parent Distribution), Statistical Theory II (Sampling Distributions and Inference), Sample Survey Designs, Advanced Analysis II, Advanced Calculus for Statistics, Stochastic Processes, Econometric Methods and Linear Programming. Lectures on Linear Equations (Matrix Algebra) and Production Functions will be given in the Institute program.

Inquiries should be addressed to: Professor J. A. Rigney, Department of Experimental Statistics, North Carolina State College, Raleigh, North Carolina.

Additional Committees Appointed

President Gertrude M. Cox has announced the following committees have been appointed for 1956. This list is a supplement to the committee listings which appeared in the February issue of *The American Statistician*.

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1956 Middle Atlantic Conference of ASQC

The 1956 Middle Atlantic Conference and Aircraft Division Meeting of the American Society for Quality Control was held in Washington, D. C. at the Shoreham Hotel, February 10th and 11th. Four concurrent series of lectures and panels in the areas of education, industrial applications of quality control, administrative applications, and applications specific to the aircraft industry were presented.

The prepared papers have been published as the Conference Transactions. Subjects covered include: quality control from laboratory through production, use of audio and visual aid in improving quality, continuous sampling inspection, statistical vs. psychological bias in consumer taste preference research, quality control without a paperwork empire, applications of standard chi square, work sampling technique, statistical techniques in the office, sampling applied to accounting problems, process capability studies, quality control in other countries, use of sensory test panels, process control through frequency distributions, statistics in the physical sciences, quality control in airline accounting, techniques in training for quality control, concepts of specifications, control charts, control for short runs, government vs. private industry philosophy of quality control, a quality control plan for an aircraft company, quality control and operations research, making scrap and rework costs understandable, advantages and limitations of use of the range, and the variables in reliability.

Conference Transactions can be obtained for $2.50 per copy by writing to Andrew H. Nash, Chairman Transactions Committee, 5320 Blackistone Road, Washington 16, D. C.

Training Grants in Biostatistics

Opportunities for training in the field of biostatistics leading to degrees up to the doctorate have become available through grants awarded by the National Heart Institute of the Public Health Service to departments of biostatistics in several schools of public health. From these grants the departments of biostatistics are able to offer stipends covering tuition and subsistence to acceptable candidates. The amounts of the stipends will vary with the qualifications and circumstances of the applicants. Recipients of the stipend awards will be expected to complete a course of studies concerned with the application of statistical theory to research in biology, medicine, and public health. The background and interests of the student will determine the nature of the courses to be taken. Additional information may be obtained from the departments of biostatistics in the schools of public health of the University of California, Berkeley, Cal.; Columbia University, New York, N. Y.; Harvard University, Boston, Mass.; Johns Hopkins University, Baltimore, Md.; University of Michigan, Ann Arbor, Mich.; University of Minnesota, Minneapolis, Minn.; University of North Carolina, Chapel Hill, N. C.; University of Pittsburgh, Pittsburgh, Pa.; and Tulane University School of Medicine, New Orleans, La.

Short Course in the Box Method of Experimentation

A three day course in the Box method of experimentation will be given at Harvard Business School May 21 to 23, 1956. The course is being sponsored by the Chemical Division, American Society for Quality Control. Instruction will be in charge of J. S. Hunter of the American Cyanamid Company who wrote his doctoral thesis at North Carolina State College working directly under G. E. P. Box and who has had varied and profitable experience with the use of the technique both at North Carolina State College and with the American Cyanamid Company.

The Box method (sometimes called Box-Wilson) is a system for designing an experiment to determine the dependence of a response on many variables. This is accomplished by a systematic choice of the independent variables in such a way as to obtain roughly uniform accuracy thruout a desired region independently of the particular coordinate system in which the independent variables are measured. Applications have been made principally in chemical engineering and agriculture.

Enrollment in the course will be limited to forty. Fee for the course will be $100 including board and lodging at the Harvard Business School. For further information write Maynard S. Renner, Dewey and Almy Chemical Company, Division of W. R. Grace & Co., 62 Whittemore Avenue, Cambridge, Mass.

U.N. Statistical Yearbook 1955

This seventh issue of the Statistical Yearbook, prepared by the Statistical Office of the United Nations, was released on March 12. The statistical authorities of 148 countries and territories, as well as the U. N. specialized agencies and other inter-governmental bodies, cooperated in its preparation.

The "Statistical Yearbook 1955" contains 183 tables relating to demographic, economic, financial, social and cultural subjects, generally covering a 20-year period ending 1954 or mid-1955. There are also two appendices, one giving conversion factors and the other listing the

Continued on page 18

FEDERAL STATISTICAL ACTIVITIES

1957 Budget Recommendations for Major Statistical Programs

Budget recommendations for major statistical programs for fiscal year 1957 were again summarized in a separate Special Analysis in the 1957 budget document. The program for 1957 has been formulated in the light of recommendations made in a number of recent studies concerned with the adequacy of present statistical series to serve the purposes for which they are used. Recommendations have been made for a number of specific improvements, and the 1957 budget, as submitted to the Congress, includes provision for meeting urgent needs for improvement where immediate action is feasible.

The agencies included in the Special Analysis of Federal Economic Statistical Programs are the Agricultural Marketing Service and Agricultural Research Service in the Department of Agriculture; the Bureau of the Census, Business and Defense Services Administration, and Office of Business Economics in the Department of Commerce; National Office of Vital Statistics in the Department of Health, Education, and Welfare; Bureau of Labor Statistics in the Department of Labor; Internal Revenue Service in the Department of the Treasury; Federal Trade Commission; and Securities and Exchange Commission. Statistical programs of these agencies account for most of the basic economic statistics of the Federal Government. Some other programs not included in the summary (e.g., those of the Bureau of Employment Security, Social Security Administration, Interstate Commerce Commission) also contribute importantly to the Government's statistical system, primarily as a consequence of statistical data collected in the course of administrative operations.

For current statistical programs, the Special Analysis includes $35.1 million for fiscal year 1957—an increase of $3.2 million over fiscal year 1956. Among the statistical series for which this overall increase provides specific improvements are those on construction, retail inventories, plant and equipment expenditures, the labor turnover program, industrial injuries, the Consumer Price Index, agricultural marketing research, economic and statistical analyses for specific agricultural products, rural manpower, the national income and product and related economic indicators.

For periodic census programs, the Special Analysis includes provision for the 1957 Census of Governments, a national housing inventory, and preparatory work for the 1958 Censuses of Business, Transportation, Manufactures and Mineral Industries.

Copies of the Special Analysis on Federal Economic Statistical Programs may be obtained from the Publications Unit, Bureau of the Budget, Washington 25, D. C.

Sample Expansion of the Current Population Survey

The Bureau of the Census is in the process of expanding the sample for the Current Population Survey (CPS). The purposes of the expansion are:

1. To increase the accuracy of published statistics.
2. To provide additional detail and subclassifications within tables presently being provided.
3. To make possible more reliable regional statistics for summary characteristics.
4. To provide limited information for most of the nine Census divisions and perhaps for a few of the largest States.
5. To further improve the estimates of variances based on the sample results.

Additional funds were provided by Congress for the sample expansion, improved quality control, and additional research and experimentation in order to enlarge and improve the scope of the CPS. The program of sample expansion which is being evolved as a result is discussed briefly below.

Principal Aspects of Sample Expansion and Sample Design—A multistage sampling design is being used identical in principle to the present 230-area design. The expanded sample will contain 100 new areas or 330 areas in all, comprising 638 counties and independent cities in all 48 States. Further, the total number of households in the sample will be expanded by two-thirds. The present level of 21,000 interviewed households in the 230 areas is being expanded to 35,000 interviewed households in the 330 areas.

The expansion is being started with the present 230 strata designed in connection with the 1953 redesign of the CPS sample (see April-May 1954 issue of *The American Statistician*, pages 5–6), in which the 230 sample areas represent the 230 strata. The 96 largest non-self-representing strata are being subdivided into 196 strata independently of the existing 96 sample areas within them. The existing 96 sample areas will continue to represent the new strata in which they occur. In the other new 100 strata, 100 new sample areas are being selected utilizing the same principles used in setting up the original 230-area sample design. These 196 strata, together with the other 134 strata which are not being subdivided, result in the 330 strata to which the sample is being expanded. Thus, the 230 areas in the present sample are continuing intact as part of the 330-area design.

The distribution of the 330 areas by type and geographic region is shown in the following table:

Number of Sample Areas by Region and Type of Area

Area	Total Number of Sample Areas	Self-representing Areas (Standard Metropolitan Areas)	Non-Self-representing Areas	
			Standard metropolitan areas	Others
United States	330	92	30	208
Regions				
Northeast	54	23[1]	8	23
North Central	96	24[2]	10	62
South	136	29	11	96
West	44	16[2]	1	27

[1] Includes two self-representing areas that are not standard metropolitan areas.

[2] Includes one self-representing area that is not a standard metropolitan area.

The effect of the expansion to 35,000 interviewed households is to increase the number of households in the sample within 134 of the existing 230 areas by two-thirds, reduce slightly overall the number in the remaining 96 areas in the present design, and to designate a sample of households within the 100 new areas. Within each of the 330 sample areas sampling rates have been determined so that the sample of 35,000 interviewed households is self-weighting. For the

selection of the specific sample households, area sampling methods identical with those currently in use will be continued. Within each of the sample areas a sample of segments is being utilized, the segments containing in general an expected size of about six households. Within the 134 sample areas where the sample is expanding by two-thirds, the expansion segments are to be systematically interspersed with the existing segments.

Effect on Sampling Variability—It is expected that the effect of the expansion will be to reduce the standard error for data from the CPS (including key statistics such as total labor force, nonagricultural employment, agricultural employment, the unemployed, and the total not in the labor force) to about 80 percent of the level at the 230-area sample. An implication of the gain in reliability arising from the expansion is the likelihood of regular publication of a substantial number of data for the four major regions (Northeast, North Central, South and West), and summary statistics for most of the nine geographic divisions used by the Census Bureau. It is also possible that some limited data can be provided for a few major States (New York, California, Pennsylvania and perhaps a few others) on a quarterly or semiannual basis.

A further implication is that for statistics for the United States as a whole, gains in reliability will result for detailed cross-classifications now available, but published only as annual or monthly averages or in the form of percentage distributions. For example, data on the long-term unemployed and their characteristics will be somewhat more reliable. Also statistics on the occupational distribution of the employed and unemployed will undoubtedly be expanded to show somewhat greater occupational detail and more cross-classifications with other characteristics.

Program for Expansion—Present plans call for data from the expanded sample to be integrated into the official estimates in the late spring of 1956. A composite estimation procedure is used for the CPS. The composite estimate for each month is obtained by giving 50 percent weight to each of two estimates. One of these is computed by adding an estimate of change based on units in the sample in the current as well as the preceding month to the composite estimate for the preceding month. The second is computed entirely from the sample for the current month. Only the latter of these two estimates will be affected by the expanded part of the sample in the month of introduction. In succeeding months, the expanded part of the sample will also contribute to the estimate of change in the first of these two estimates.

Establishment of the new sample and recruitment and training of new enumerators is being accomplished on a gradual basis starting in December 1955. The sample expansion is being introduced with adequate training for new enumerators and safeguards to insure maintenance of quality of the work of existing enumerators. The number of district offices is remaining constant but the staff in some of these offices is being increased. The system of quality control instituted in 1954 is being continued for the expanded sample to provide quality control at the same level per enumerator as in the 230-area design.

The number of enumerators is being increased from about 350 to 600. A substantial group of the new interviewers started its training in December, another large group in February and a third smaller group in March. During the training period new interviewers are being given several days of basic indoctrination including class room work, field demonstrations, and tests of various kinds. In addition, limited practice enumeration observed by a supervisor is also scheduled. The initial training and practice enumerations are being conducted in the week or two preceding the regular enumeration week each month. This avoids conflicts with the regular supervisory activities required for the existing CPS operation. The practice enumerations are being conducted in a normal fashion so that the new interviewers feel that they are a part of the regular organization and subject to the same requirements as the present interviewers. Later test runs for new interviewers will be conducted during the regular CPS week. At that time new interviewers will be subject to the same time pressures and quality control measures as regular interviewers.

The present expansion plan contains the following safeguards during the transition period:

1. All of the present 230 sample areas are included in the expanded 330-area sample. Most of the expansion consists of adding households in existing areas; only about 15 percent of the entire expanded sample will consist of households in new areas. No jobs of present interviewers in the 230-area operation will be terminated because of the sample expansion.

2. The period of time allotted to training and other preparatory activities for the expansion is spread over approximately twice as many months as provided during the 1953–54 changeover.

3. An extensive systematic program of training, observation, and checking of interviewers has been in operation for the present 230-area staff and will continue without interruption during the transition period and thereafter. As already noted, the practice phases for the expansion have been scheduled at a different time of the month from the regular enumeration in order that field supervisors will have sufficient time to maintain the systematic controls and quality of enumeration in the present operation.

JOSEPH STEINBERG,
Chief, Statistical Methods Branch, Population and Housing Division, Bureau of the Census

Cooperative Labor Turnover Statistics Program

On the basis of Congressional appropriations for fiscal year 1956, the Department of Labor is launching a program for the collection and publication of labor turnover statistics which will integrate the current activities in this field of the Bureau of Labor Statistics, the Bureau of Employment Security, and State employment security agencies. The BLS has been computing and publishing monthly labor turnover rates for manufacturing on a national basis for more than a quarter of a century. Over the years, rates have been prepared for an increasing number of individual industries until, at the present time, they are published for 120 industries in manufacturing, mining, and communication activities. Since the early days of World War II, the State employment security agencies have been collecting labor turnover data from a large number of establishments, both for internal operating purposes and for publication as part of their labor market information releases. Turnover information is included in the bimonthly Labor Market Reports received by the BES from some 150 major labor market areas. The new program will integrate these activities into a single program from which labor turnover rates will be available for local areas, States and the Nation.

Arrangements for introducing the program are being made jointly by the BLS and the BES on a State-by-State basis. When the turnover program is instituted in a State, responsibility for data collection for all establishments in the current national sample for that State is being transferred from BLS-Washington to the State employment security agency. The

Continued on page 11

SOME STATISTICAL ASPECTS OF A PROBLEM IN SCIENTIFIC PHILOSOPHY*

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The ever increasing role which science plays in the progress and development of our society emphasizes the need for a clear understanding of the nature of scientific knowledge. Since science and scientific claims are often belittled, exaggerated, and misunderstood, it is the urgent task of the modern philosopher of science to justify scientific methodology on the basis of a clear cut definition of the meaning of scientific assertions. We are fortunate in being able to reach a deeper understanding of the nature of scientific knowledge by means of the powerful techniques which have been developed in recent years in the field of mathematical statistics. It is our purpose in this paper to show how some of these relatively new concepts may be used in order to reach a deeper understanding of some of the epistemological problems of science. We shall discuss, in particular, the problem of estimating probabilities, and the role of probabilities in the process of making decisions.

It appears safe to assert that scientists and philosophers alike agree that the concept of probability plays a fundamental role in modern science. In spite of this general agreement, the same can hardly be said in regard to its interpretation and the extent to which probability can be used to take the place of the concept of "truth". What we actually do in estimating a probability consists of counting the frequency with which certain attributes occur in a sequence. Let us imagine that the sequence

$$B\ \bar{B}\ \bar{B}\ \bar{B}\ \bar{B}\ B\ \bar{B}\ \bar{B}\ \bar{B}\ \bar{B}\ \bar{B}\ B\ \bar{B}\ \bar{B}\ \bar{B}\ B\ \bar{B}\ \bar{B}\ \bar{B}\ B\ \bar{B}$$

is the result of a series of experiments, where the attribute B is used to denote a "success" and $\bar{B}$ denotes "failure". From this experiment, we would estimate[1] that the probability of success is 0.25.

When we make such an estimate, it certainly seems reasonable to ask how we can ever know whether these attributes are given correctly. Each time we wish to represent a situation by some attribute, we must *decide* whether it has, in fact, that attribute, or not. Consequently, any estimate of a probability must be given *relative to a method of decision*. Since this question arises even in the simplest problems, let us discuss some of the basic properties of the most primitive as well as the most complicated methods of decision.

Recent developments in modern statistical theory have provided us with convenient tools for the comparison and analysis of various methods of decision. In order to distinguish between such methods, Neyman and Pearson[2] have advanced the following ideas. They suggest that *we judge a method of decision by the type and magnitude of errors which it is liable to commit.* This theory is best illustrated by a simple example which considers the case where there are only two alternatives. If the situation which we wish to describe has the attribute B (say) and if we have reached the decision B, we have evidently not made a mistake. If, on the other hand, the correct decision is B while our method of decision has told us $\bar{B}$, or if the correct decision is $\bar{B}$ while we have been led to accept B, we would obviously have made an error. There are, in fact, two kinds of errors in this example[3] called the type I and type II errors, respectively. They can easily be visualized from the arrangement shown in Figure 1.

Actual Situation	Decision Reached	
	Attribute B	Attribute $\bar{B}$
Attribute B.....	No error	Type I error
Attribute $\bar{B}$.....	Type II error	No error

Figure 1

Similar considerations may, of course, be carried through in the case where we have to decide between more than two alternatives. If there are n alternatives to choose from, e.g., if we consider n different attributes A_i, we can make $n(n-1)$ different types of errors, which are committed whenever we accept attribute A_j while A_k was in fact the true situation ($j \neq k$). A method of decision is therefore sufficiently described, at least for our purpose, if we have some means of as-

* Research sponsored by the Office of Ordnance, U. S. Army Contract No. DA-36-034-ORD-1527RD.

[1] J. E. Freund and I. Miller, "In Defense of Frequencies," The American Statistician, Vol. 9, No. 2, April 1955.

[2] J. Neyman and E. Pearson, "Contributions to the Theory of Testing Statistical Hypotheses," Statistical Research Memoirs, Vol. 1, 1936.

[3] A correspondingly more complicated table could be constructed for more complex situations.

sessing the probabilities with which the various types of errors are made.

Let us consider an example which, for reasons of simplicity, involves only two alternatives. Since many problems in Quality Control are of this type, let us take the case of the manufacturer who wants to know whether a lot which he has manufactured meets specifications, or whether it falls below a certain prescribed standard. To obtain this information, we would have to employ some sampling plan (method of decision) on the basis of which we can decide whether to accept or reject any particular lot. Any such sampling plan may commit an error, since it might accept a lot which is actually not up to standard, or it might reject a lot which meets specifications. In order to set up such a sampling plan, the manufacturer would have to decide on the relative frequency with which he is willing to risk making these mistakes, i.e., he would have to specify the probabilities of committing the type I and type II errors.

There exists another kind of question, however, which the manufacturer might reasonably want to ask. He may want to know the percentage of "good" lots among all the lots which he has produced, that is, he may ask for an estimate of the probability that any one lot which he manufactures will meet the specifications. Let us assume that he has the following statistical information: with the aid of some definite sampling plan, 750 lots have been accepted during the past year, while 250 have been rejected during the same period of time. Does this imply that we may now estimate the percentage of good lots as 750/1000, or the probability that any one lot is good as 0.75? Although this procedure might seem reasonable at first, it involves an essential question regarding the bias which is introduced into such an estimate by the method of decision which happened to be employed.

Let us consider the case of a manufacturer who is extremely reluctant to reject a good lot, while it does not matter to him if a bad lot is accepted once in a while. To suit his purpose, he would employ a method of decision with a very small type I error. (Here B stands for "a lot meets specifications".) As a consequence, in the course of a year, the chances are that many of the lots which were accepted were actually bad, while few of the rejected lots were in fact good. His estimate of 0.75, then, would be considerably in his favor. On the other hand, the manufacturer who wants to shift the advantage to the consumer would hold the type II error to a minimum, perhaps allowing the type I error to increase. His estimate of 0.75 would then be too small.

It seems reasonable to ask whether there is some method that could be used to calculate this bias. To find an answer to this question, let us consider a simple mathematical model. Let the actual probability of obtaining a good lot be p', and let the probabilities of type I and type II errors be denoted by α and β respectively. Using the rule of elimination[4] we may calculate the probability that any given lot will be accepted under the sampling plan to be

$$p = p'(1 - \alpha) + (1 - p')\beta$$

which can be seen from the schema given in Figure 2.

Figure 2

If we let the relative frequency with which the lots have been accepted by this method of decision be f (in the previous example $f = 0.75$), then f' is an *unbiased* estimate of the probability p', if

$$f' = \frac{f - \beta}{1 - \alpha - \beta}$$

This does not mean that f' is going to be a "better" estimator than f in the sense that it will always be closer to p'. It merely implies that in repeated sampling, the values of f' will average to the actual probability p', instead of to p. If we use f' instead of f, we will have eliminated the bias in estimating p' due to the chosen method of decision.[5]

This formula might reasonably be criticised for the reason that f' can take on values outside the (0, 1) interval usually associated with estimates of probabilities. This condition will only arise, however, when $\alpha + \beta$ is fairly large, or when β is greater than f. It is obvious that if α and β are large, we are using an extremely poor method of decision. In fact, if α and β are both greater than 0.5, we would be better off to flip a coin, since coin-tossing is a method of decision with $\alpha = \beta = 0.5$.

We are now led to the fundamental question of how to evaluate the comparative merits of several methods

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[4] See H. Reichenbach, "The Theory of Probability," Univ. of California, 1949, page 76.

[5] It is interesting to note that even the rapidity with which estimates of p' will approach p' as a limit is dependent upon the method of decision. It can be shown that the *variance* of f' is given by the expression.

$$\sigma^2_{f'} = \frac{p'(1-p')}{n} \frac{1}{n} \left\{ \frac{p'\alpha(1-\alpha) + (1-p')\beta(1-\beta)}{(1-\alpha-\beta)^2} \right\}$$

where n is the size of the sample. This demonstrates very clearly how the "second level" probability, $Pr\{|f' - p'| < \epsilon\}$, depends upon α and β, and hence, upon the method of decision which was used for the estimation of p'.

of decision. The common practice in the construction of statistical tests is to specify values of α and β in advance, selecting the decision procedure accordingly. Usually, this cannot be done if the method of decision consists of a direct observation. In fact, with regard to direct observations, it is extremely difficult even to know that we have made a mistake, let alone to compute the probabilities involved. Consider, for example, that we are looking at an object which we decide must be a house. After a while, we look again, and this time conclude that it is a garage. Obviously, we made a mistake either the first time, the second time, or, for that matter, each time we named the object. Suppose we were to return to the scene of our confusion several additional times in the future, deciding on each of these occasions that the object in point was a garage. We might naturally conclude that the object is, in fact, a garage, and that our first decision was wrong.

Let us examine the reasoning behind this conclusion. We have assumed here that the object, whatever it is, remains unchanged throughout the period of observation, and it follows that in one of our descriptions we have made a mistake. We could have refrained from making this assumption, substituting instead the alternative notion that the object might have changed in some way while it was under observation, so that it is possible that all of our observations, contradictory as they might seem, were actually correct. Furthermore, we could have been wrong on each occasion, and the object was neither a house nor a garage. We shall eliminate the latter two alternatives immediately, not on logical grounds, but because their acceptance would give us an incoherent picture of the external world. Accepting the first of these, i.e., that the object changed while under observation, would be equivalent to postulating the infallibility of sense perception, and the resulting picture of "reality" would thrive on magical phenomena and mystical laws. Accepting the second alternative would imply that empirical methods cannot be relied upon to give us a correct description of the universe with any reasonable degree of certainty. It must be pointed out, however, that the decision we have made not to allow objects to change under observation does not always lead to the most reasonable explanation of natural phenomena. In certain experiments in physics it is far more convenient to accept this alternative, postulating certain objects called "illata", which cannot be observed directly.

Having limited ourselves to the original assumption, we must nevertheless ask whether the mistake was made the first time, or in each of the succeeding instances. Suppose the conclusion "the object is a garage" to have been arrived at on nine successive occasions following the original assertion that it was a house. This problem is identically that which arises in the sampling theory of statistics, where we attempt to estimate the value of a parameter from a sample of n observations. For this purpose, statisticians use a method such as maximum likelihood[6] which chooses for the estimated value of the parameter that value which maximizes the probability of obtaining the given sample. In our problem we reason that, had the object really been a house, the probability of a sample consisting of one house and nine garages would be quite small, whereas the sample has a far larger probability under the hypothesis that the object was a garage. We have tacitly assumed here that our observations were given essentially without error, that is that the probabilities α and β are small.

It is extremely fortunate that our methods of observation permit the use of this model for the analysis of scientific knowledge. If the values of α and β were not small, it would be impossible to construct a theory of knowledge on an empirical basis. Of course, there always exists room for improvement, and science is continually devising methods for the further reduction of these probabilities. These new ideas are calculated to eliminate the bias which the human observer introduces into our picture of the universe.

The problem of estimating a probability is actually a good deal more complicated than we have heretofore indicated. We have considered, up to this point, sequences consisting of two values of a single attribute, B or $\bar{B}$. There are many problems, however, in which it is necessary to take into account simultaneously two or more attributes. Consider for example the problem of estimating the rate of recovery from a certain disease, A. For each incidence of A, let B stand for recovery, and $\bar{B}$ for a mortality. Our sequence may now be as follows

$$\begin{array}{c} \bar{B}\ B\ B\ B\ B\ \bar{B}\ B\ B\ B\ B\ B\ \bar{B}\ B\ B\ \bar{B}\ B\ B\ B\ \bar{B}\ B \\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A\ A \end{array}$$

Assuming that the disease was diagnosed correctly in each case, and that "recovery" was well-defined and interpreted properly in each case, we would estimate the rate of recovery from disease A to be 0.75. However, had a number of the diagnoses been made incorrectly, the value 0.75 might have contained considerable errors in addition to those due to sampling. Such errors generally are termed lack of experimental control.

In order to study the effects of lack of control, let us consider a typical numerical example. Suppose that a physician wishes to estimate the rate of recovery from a given disease, say disease X, under some specified conditions of treatment. We shall assume that the following are known to a fair degree of accuracy from prior experience:

1) The probability that a patient who is admitted to a hospital has disease X (event A) is known to be r.

[6] Recent developments in the theory of statistical decisions have provided the statistician with a variety of other estimation procedures.

2) The probability that the physician will correctly identify a case of disease X is given by $(1 - \alpha')$.

3) The probability is q that a patient, not afflicted with disease X but diagnosed as having it, exhibits symptoms equivalent to recovery from this disease.

4) The probability that the physician will diagnose disease X when the patient has a different disease is β'.

5) The probabilities of concluding recovery from disease X (event B) falsely, and non-recovery (event $\bar{B}$) falsely are α and β, as before.

The actual rate of recovery within a specified class of people,[7] p, *is the probability that we are attempting to estimate.*

The two probabilities, α' and β', express the diagnostic ability of the physician, and may be known fairly accurately from his past performance. The probabilities q and r are estimated from hospital records, and may be known with a high degree of accuracy, while α and β depend upon the criterion which is employed in deciding whether or not a patient is cured.

Let us denote by P_1 the probability that a patient will be diagnosed as having disease X, *and* be classified as recovering from it. Let P_2 be the conditional probability of being classified as recovering from disease X, *given* that the patient has been diagnosed as having this disease. P_2 is the rate of recovery that the physician will claim for disease X. These two probabilities can be obtained from the schema of Figure 3, which is a modified form of the rule of elimination.

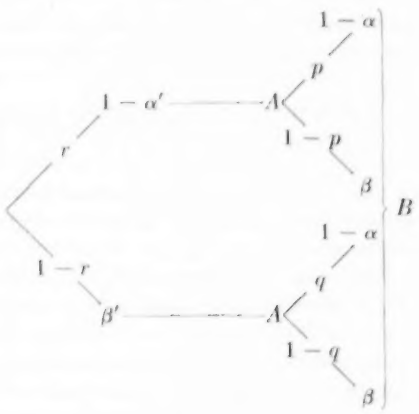

Figure 3

In Figure 3, the two ways of obtaining attribute A (patient has disease X) are represented by the two major branches. The upper branch does not involve a diagnostic error, while the lower branch does. In either case, we can get recovery (attribute B) in two ways, one of which involves an error. There are therefore four ways of obtaining attributes A *and* B, and we write

$$P_1 = r(1 - \alpha')[p(1 - \alpha) + (1 - p)\beta] + (1 - r)\beta'[q(1 - \alpha) + (1 - q)\beta]$$

and

$$P_2 = \frac{P_1}{r(1 - \alpha') + (1 - r)\beta'}$$

where the denominator of the second equation is the probability that the physician diagnoses any patient as having disease X.

Now, let f stand for our *estimate* of P_2, i.e., f is the *relative frequency* with which patients, diagnosed as having disease X, are classified as recovering from it. Since P_2 is a function of p, an "unbiased" estimate of p is obtained by solving the equation $f = P_2$ for p. This estimate (call it f') is given by the expression

$$f' = \frac{f - \beta}{1 - \alpha - \beta} - \left(\frac{1 - r}{r}\right)\left(\frac{\beta'}{1 - \alpha'}\right)\left(q - \frac{f - \beta}{1 - \alpha - \beta}\right)$$

In order to understand the significance of this formula, let us assign numerical values to the probabilities which we assumed to be known. Our physician states that his treatment results in 60 percent of his patients being "cured", ($f = 0.60$), which, he claims, is a remarkable achievement. His superiors are somewhat doubtful of these results, however, and decide to investigate the validity of his experiments. They know from past experience that 10 percent of the patients admitted to their hospital had disease X ($r = 0.10$). Furthermore, it is known to them that this particular physician is rather a careless diagnostician, and they assign to both α' and β' the value 0.10. In his anxiety to produce good results, our physician is prone to pronounce patients cured on fairly sketchy evidence, with the result that α and β are assigned the values 0.01 and 0.10 respectively. The probability q, namely that patients will recover from other diseases is taken to be 0.90, after an examination of hospital records.

Substituting these values in the formula for f', the *unbiased* estimate of the rate of recovery is 0.22, not 0.60, as claimed. This shows quite clearly the tremendous effect that methods of decision can have on the evaluation of probabilities. It also indicates the need for rigorous experimental control, and precise definitions of what is meant by a "cure". The only possibility of eliminating this bias consists of increasingly more accurate methods of decision. If, in our example, we had chosen both α' and β' equal to 0.001, and if α and β were both chosen equal to 0.01, the unbiased estimate of the rate of recovery would have been 0.599. It is striking how close this is to the value of f, in spite of the fact that the methods of decision are still far from perfect. It is true, of course, that taking $\alpha = \beta$ and $\alpha' = \beta'$ tends to mask the bias, but further reduction of

[7] In this example we consider the class of individuals having the given disease who are admitted to the hospital.

any *one* of these values would make the result even closer to 0.60.

It has been our purpose in this paper to show the effect that methods of decision have on the evaluation of probabilities. This is an important point, because probabilities can be evaluated *only* relative to given methods of decision. We have also attributed "objective existence" to objects if our decisions concerning these attributes are consistent. Thus, when we say that a chair "really exists" in the objective sense we are expressing more than the mere fact that we have classified a certain experience. We are implying that everyone else would arrive at the same conclusion, that is, unless he makes a mistake. Since we can never know for sure when our method of decision is making a mistake, we have defined "objective existence" in terms of the consistency of decisions. Thus objectivity has been characterized by decisions which are by no means infallible. Absolute objectivity can only be defined in a limiting sense, that is, when the two probabilities, α and β approach zero.

Science has been striving toward objectivity by improving its methods of decision in fundamentally two ways. First of all, scientists have become increasingly aware of the need for rigorous definitions in terms of an experimental, or more properly, an "operational" language. Insisting on operational definitions is nothing more than demanding rigorous and well defined methods of decision.

Secondly, science strives toward objectivity through insistence upon rigorous experimental control, and the elimination of personal bias. Recognizing the fallibility of the human observer, science has persisted in the basic demand that results be reproducible. Indeed, at times committees have been appointed to investigate research which has been done in a field of scientific work. The purpose of such committees is twofold. First, it is their task to eliminate the various kinds of bias which might have crept into the experiments, either due to intent, or to lack of control. In addition, such committees are generally concerned with providing us with improved methods of decision on the level of direct observations, for a large number of individuals are far less likely to make a given mistake than is a single experimenter.

It is true that we have vastly oversimplified the problem in the various formulae which have been developed in this paper. On the other hand, it should be noted that it has been our purpose to analyze the basic structure of the problem rather than to give a complete solution which would be a tremendous task, indeed.

FEDERAL STATISTICAL ACTIVITIES—Continued from page 5

BLS notifies employers in the sample that the State employment security agency has taken over the collection of turnover statistics. At the same time, the State agency notifies the present BLS turnover sample firms of the new program, solicits their continued cooperation, and, in cases where the establishment is currently reporting labor turnover and other data to the State agency, explains the new arrangements for collecting the information.

The program is being introduced in some 20 States (including major areas within these States) in the current fiscal year. At the outset, the sample will be developed to include all manufacturing and mining establishments which employ 20 or more workers and are now included either in the sample for the Current Employment Statistics Program or in the employment service "major market" group (larger firms accounting for about 75 percent of the employment in each local office area). Eventually, it is hoped to extend the program to cover all nonagricultural industries and States and the major areas within the States.

This extension of the labor turnover statistics program eventually will permit publication of national turnover rates in greater industrial detail and for industries for which such information is not now available. At the same time, through the combined technical resources of the two Bureaus and the State agencies, improvement is expected in the national, State, local area and individual establishment data on labor turnover. This expansion and improvement of labor turnover statistics should greatly enhance their value as economic indicators, as guides to employers, labor organizations and others interested in labor market problems, and as an essential tool in employment security administration.

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LOUIS LEVINE,
Assistant Director,
Bureau of Employment Security

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AN AUTOMATIC COIN FLIPPER FOR SAMPLING DEMONSTRATIONS

R. CLAY SPROWLS

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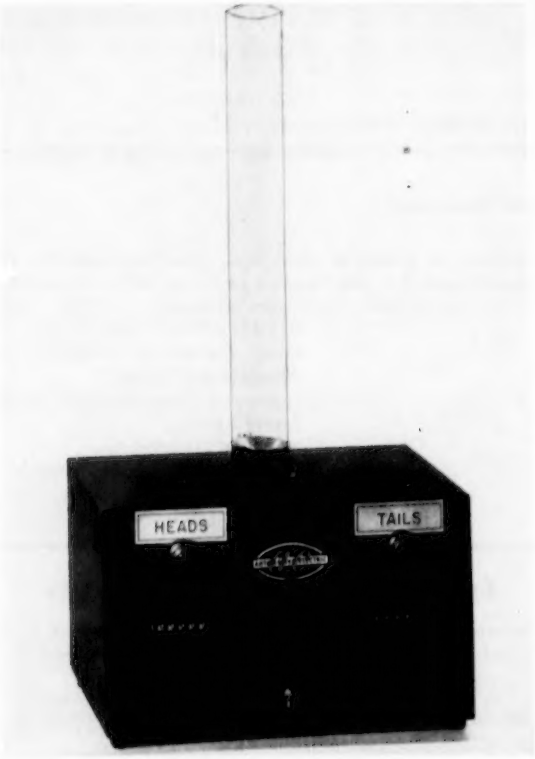
Coins, dice, cards, roulette wheels and slot machines are used by instructors of statistics to demonstrate elementary principles and to give students first-hand experience with sampling. Colored beads are also in common use and some instructors have boxes of beads and specially constructed paddles with which to sample the box. Brown and Leavens have designed a sampling box in which beads are not in view but run out into a glass tube upon tilting the box.[1] The writer has used a similar model successfully for a number of years, but he now has a more elegant sampling device—an automatic coin flipper.



Automatic Coin Flipper

As a term project required of all students in elementary statistics, one student constructed an automatic coin flipper which has been redesigned and is shown in the figure.[2] When the machine is plugged into an ordinary 60 cycle, 120 volt current outlet and the switch turned on, a spring loaded solenoid actuates a hammer. This hammer strikes a quarter[3] flipping it up into a transparent plastic tube twenty inches long. (The tube prevents the coin from flipping out onto the floor.) The coin drops down to rest on a machined base containing both a hole for the hammer and an electrical contact. The contact "reads" the face of the coin—head or tail. A red light is lit if the coin is head and a counter tallies head. A green light is lit if the coin is tail and a tally is made on a separate counter. The hammer then strikes the coin again and the process continues uninterrupted until the switch is turned off.

The solenoid controlling the hammer is actuated every ten seconds. The contact "reads" the face of the coin by completing a circuit through the coin if it is head and not completing the circuit if it is tail. The tail of the coin must, therefore, be insulated. Insulation can be either scotch tape or a coating of liquid plastic. The tape is to be preferred because it may readily be removed if one needs the quarter for another use, although a coin with one side plastic-coated may still pass as legal tender. Neither insulating material has biased the coin enough to be detected in several thousand trials.

This automatic coin flipper will demonstrate all of the common problems associated with the sampling of dichotomous populations. The writer has used the apparatus for the following experiments—a list not meant to be exhaustive, but merely illustrative:

1. Estimating the percentage of heads
2. Testing the hypothesis of a "fair" coin with single and sequential sampling.
3. Testing the randomness of a series of tosses with run theory
4. Building up empirical sampling distributions

[1] Theodore H. Brown, and Dickson H. Leavens, "A Sampling Device," *The American Statistician*, Vol. 5, No. 4, October, 1951, pp. 16 and 17.

[2] This coin flipper was made by Francis Semere, who is both a student at UCLA and entrepreneur of a small automotive parts manufacturing enterprise, Automative Electric, in Los Angeles. Although this is the only model coinflipper available to date, similar machines can be made by his firm.

[3] Experiments were performed with nickels, dimes, quarters and half dollars. The quarter is the best size for this machine.

5. Demonstrating the Law of Large Numbers[4]
A particularly nice feature of this machine for these demonstrations is that the coin can be biased without altering its appearance to an audience a short distance from the machine. A close-up view will reveal the tape insulation, but in the classroom students can be kept at some distance, at least at the beginning of the experiment. Since reading the face depends only upon insulation against electrical conductance, all of one face and part of the other may be taped to bias the coin. An untaped coin is two-headed to this machine; a coin taped on both sides is two-tailed.

Experience with the coin flipper has shown it to be much more fascinating to audiences than a box of beads or even the fancier bead box mentioned. Students ranging from juniors in college to rather mature participants in an Executive Training Program have not failed to be charmed by it.

[4] Demonstration of the Law of Large Numbers would be simplified if a second set of non-resettable counters were attached to the apparatus to tally a continuing record of heads and tails. Such a record is now lost each time the counters are reset at the beginning of another experiment. The cost of these counters is too high to include them in the present model.

AN EMPIRICAL STUDY OF AN ESTIMATE OF SKEWNESS FOR THE PEARSON TYPE III DISTRIBUTION

*JOHN CAFFREY, N. C. PERRY, and D. TEICHROEW**

In behavioral research, the investigator is frequently faced with the problem of deciding whether two samples come from identical populations or, at least, from populations with the same mean. When the population sampled can be assumed to be normal, mathematical statistics has supplied techniques to answer such questions with specified confidence. These methods are simple to apply, involving merely the sample means and variances. However, in the analysis of certain kinds of behavioral data one occasionally encounters sample distributions which suggest a skewed parent distribution. The question then arises: What are reasonable procedures for such cases?

A model which appears to be applicable to many such problems is the Pearson Type III distribution, which in its most general form is given by

$$\frac{1}{\sigma\Gamma(\delta)}\left[\frac{x-\alpha}{\sigma}\right]^{\delta-1} e^{-[(x-\alpha)/\sigma]}\,dx \qquad \begin{matrix} 0 < \sigma \\ 0 < \delta \\ \alpha \leq x \leq \infty \end{matrix}$$

To simplify the application, we may transform the data by $y = x - \alpha$ and without loss of generality assume $\alpha = 0$. The parameter σ is essentially a scale factor, and since we are usually interested in estimates d of the parameter δ which are independent of the scale we may assume $\sigma = 1$. The principal problem, then, lies in the estimation of δ, for if this parameter can be assumed to be a known quantity two sample means can be tested for significance by methods presented in an article by Festinger (2).

In this reference it was shown that two sample means $\bar{x}_1$ and $\bar{x}_2$ (obtained from a Pearson Type III population) have their ratio $\bar{x}_1/\bar{x}_2$ in an F distribution at $2N_1\delta$ and $2N_2\delta$ degrees of freedom. Here, of course, N_1 and N_2 are the respective sample sizes on which these means were based.

An estimate of δ can be obtained from the method of moments. Since $\mu_1 = \delta/\sigma$ and $\mu_2 = \delta/\sigma^2$, then $\delta = \mu_1^2/\mu_2$. Thus we could use $d = \bar{x}^2/s^2$; however, as Perry and Michael have pointed out (4), it may be desirable to use an unbiased estimate of μ_2, leading to $\hat{d} = \bar{x}^2(N-1)/s^2N$, when sample sizes are small. This estimate is an easily computed function of the sample mean and variance, an advantage which may to some extent offset the low efficiency which moment estimates frequently possess.

A knowledge of the reliability of $\hat{d}$ would be useful in applications. However, the literature indicates that the sampling distribution of this estimate of δ is intractable (1), (3). In view of this, an approximation to the sampling distribution of δ was obtained by empirical means.

* Preparation of this paper was sponsored in part by the Alabama Polytechnic Institute and in part by the Office of Naval Research (USN).

Method

For each of several values of $\delta = 4(2)12$ and sample sizes $N = 2(2)\ 10,\ 20$, a thousand samples were drawn from a random distribution with the appropriate value of δ, and for each such sample the transform w was computed, where

$$w = \left(\sum_{i=1}^{N} x_i\right)^2 \Big/ N \sum_{i=1}^{N} x_i^2$$

from which $\hat{d} = w(N-1)/N(1-w)$. The method for generating the independent random variates having a type III distribution with a specified value of δ is described by Teichroew (5). The computations were performed on the Bureau of Standards Western Automatic Computer (SWAC) at the University of California at Los Angeles.

The one thousand values of w for each δ and N were arranged in a frequency distribution at intervals of 0.01. These were then cumulated and the interpolated values checked on a normal probability scale against $100(1 - \log w)$ for the 99% and 95% limits tabled below. In these tables L stands for the lower limit and U for the upper limit.

From these preliminary studies it would seem feasible to pursue the approach further with values of δ and N over a larger range at closer intervals. Pending analytic solution of the sampling distribution of δ, the empirical results obtained would appear to be useful. In conclusion, the reader should be cautioned that the tabulations presented are not exact, but are accurate only to the extent that an entire population can be represented by a sample of 1000.

TABLE I

99% Limits for w for Varying Values of δ and N (Empirical)

δ	N = 2		4		6		8		10		20	
	L	U	L	U	L	U	L	U	L	U	L	U
4	.59	.99+	.57	.99+	.57	.98	.60	.97	.62	.94	.67	.92
6	.66	.99+	.65	.99+	.65	.99	.65	.99	.70	.98	.71	.96
8	.71	.99+	.71	.99+	.71	.99	.76	.98	.78	.96	.82	.94
10	.74	.99+	.75	.99+	.76	.99	.78	.99	.80	.98	.82	.97
12	.75	.99+	.78	.99+	.79	.99	.81	.99	.85	.98	.86	.98

TABLE II

95% Limits for w for Varying Values of δ and N (Empirical)

δ	N = 2		4		6		8		10		20	
	L	U	L	U	L	U	L	U	L	U	L	U
4	.66	.99+	.64	.98	.64	.96	.67	.94	.67	.92	.70	.90
6	.73	.99+	.73	.99	.72	.98	.72	.97	.75	.96	.75	.95
8	.77	.99+	.77	.99	.77	.98	.80	.97	.82	.94	.84	.92
10	.80	.99+	.82	.99	.81	.98	.82	.97	.83	.97	.85	.95
12	.82	.99+	.84	.99	.83	.99	.86	.98	.87	.96	.88	.96

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THE FUTURE ANNUAL MEETINGS OF THE ASSOCIATION WILL BE HELD AS FOLLOWS:

	Headquarters	Dates
1956 Detroit, Mich.	**Hotel Sheraton-Cadillac**	**September 7–10, 1956**
1957—Atlantic City, N. J.	Hotel Ambassador	September 10–13, 1957
1958—Chicago	Congress Hotel	Christmas Week

QUESTIONS AND ANSWERS

Edited by ERNEST RUBIN
U. S. Department of Commerce
and American University

Defective Samples

A colleague of mine states, not entirely with tongue in cheek, that all samples are defective. This extreme view should be modified to this extent; under the properties of randomness it is conceivable that a perfect sample is obtainable, but admittedly such a result may be regarded as an extremely rare event. The question that is raised quite frequently, by statisticians and by others, is: Suppose we know that the sample we have is defective; does this mean that the information in this sample is worthless?

The problems raised by this question are numerous and important; they lead to a number of unexplored areas in the field of statistics. The purpose of this discussion is to indicate certain aspects of this question which are of interest to statisticians. It would be appreciated if readers would contribute notes, comments, references, or discussion on this question, for possible use in this column.

A cursory examination of the statistical literature fails to reveal a systematic consideration of the treatment of defective samples. The primary emphasis has been to discover, by various tests of significance, whether a sample is consistent with the universe from which it is derived. The question of defective samples may be considered along the following lines; what second thoughts can we have, statistically speaking, if we reject the alternative of discarding the defective sample. There are theoretical and practical aspects of the problem which deserve close scrutiny.

A classic illustration of the defective sample, referred to in various text books, is the Literary Digest poll of 1936. It will be recalled that the Digest predicted an overwhelming victory for Landon, the Republican candidate, over Roosevelt in the presidential election of that year. The text book discussion quite properly is devoted to the errors in the sampling procedures that were made by the Digest polling organization.

To my knowledge, no text book raised the following point; suppose, *after* their poll was completed, but prior to the election, the Digest organization discovered that their sampling procedure was faulty. What course of action should they take? It will be recalled that about 10 million ballots were sent out by the Literary Digest and that 2,376,523 were returned. As a matter of record, the American Institute of Public Opinion, four months before the election of 1936 indicated that the Literary Digest sampling procedures were biased and that the Digest poll would predict a Landon victory because of these biases. The Digest organization rejected this criticism.[1]

Cornfield has indicated that the Digest data could have been used to make the right prediction, even though the sample was defective.[2] He says,

> . . . As a matter of fact, it was possible to take the published Digest results and estimate a Roosevelt majority. The poll showed that 52 per cent of the persons returning ballots in 1936 who also reported their 1932 vote had voted for Hoover in 1932, whereas Hoover had actually received 41 per cent of the 1932 vote. By reweighting in such a fashion as to assume that the poll was correct in showing the way in which 1932 Hoover and Roosevelt voters would vote in 1936, but incorrect in showing the relative proportion of Hoover and Roosevelt voters in 1932, an approximately even split in the vote between the two major candidates was indicated. Since this was the most favorable assumption that could have been made in view of the Digest's sampling procedure, a Roosevelt majority was clearly indicated.

An important survey, *Family Spending and Saving in Wartime*,[3] although based on a carefully planned sampling procedure, was nevertheless defective in certain significant characteristics. The authors of the report indicate various defects of the survey and recognize also the general problem of defective sample treatment and analysis. To quote briefly from their critique of the survey methods:

> . . . The comparisons of the findings of the survey with independent estimates . . . leave the conclusion that the sample results understate income, particularly wages and salaries and interest and dividends. The survey also underestimates the number of single consumers and correspondingly overstates the number of families of two or more. The question of how a correction for the understatement of aggregate income and of number of single consumers would affect the distribution by size of income of families and single consumers as estimated by the survey is not easily answered. No attempt is made to do so

[1] Parten, Mildred, *Surveys, Polls, and Samples*, (Harper & Bros., N. Y., 1950), page 393.

[2] Cornfield, Jerome, "On Certain Biases in Samples of Human Population", *Journal of the American Statistical Association*, Vol. 37, No. 217, March 1942, page 63.

[3] Bulletin 822, prepared by the Bureau of Labor Statistics (U.S.G.P.O., 1945).

here. In the pages which follow, there is a specific search for the sources of error . . . and consideration of the extent to which they can be avoided in future surveys and to which they are limitations which all field surveys must share. (pp. 49–50)

A defective sample is one that is not representative of the parent population from which it was obtained. In some cases, it is possible to utilize a range concept, that is, samples may range from a theoretical total (100 per cent) defectiveness to zero defectiveness or perfection. Apart from this consideration, defective samples may be divided into three categories or types. Type I embraces the class of defective samples whose sampling distributions are not consistent with the universe distributions because of quantitative differences. Under Type I are included the following cases: (a) sample observations are missing at the extremes of the distribution; or (b) sample observations are missing at the center of the distribution; or (c) sample observations are missing throughout the distribution, presumably in a non-random manner. The cases imply also, the presence of extra observations in parts of the sample distribution that likewise affect the results adversely. Type II embraces the class of defective samples whose sampling distributions are not consistent with the universe distributions because of qualitative differences. This type includes samples which contain, for one reason or another, observations of varying precision. In Type I we are concerned with the number of items in the sample and their proper arrangement, where the universe distribution indicates this arrangement. Type III may be considered as the combination of Types I and II, that is, Type III defective samples are defective in quantitative and qualitative characteristics.

The purpose of the foregoing discussion is to suggest the need for systematic analysis, theory and practice, of defective samples. By extension or generalization I may suggest that analogous, if not identical, considerations would apply to parent populations that are defective in certain characteristics.

REPORT OF THE COMMITTEE ON CENSUS ENUMERATION AREAS, 1955

After our carrying for 24 years the major responsibility of interesting people in local communities in census tracts to the extent that they have taken the initiative in laying out tracts in their communities, the Bureau of the Census has now assumed this obligation. Early in 1955 the Director of the Bureau of the Census appointed our old Census Tract Key persons in the 90 some tracted areas. The Director is now making replacements when vacancies occur and appointments in the newly tracted areas.

When the Committee was first created in 1931, there were 18 tracted cities (8 in 1910). At the beginning of 1955, this number had been increased to more than 90 communities with many of the tracted areas already extended beyond the boundaries of the original central cities. During 1955 more cities were approved by the Bureau of the Census and more communities extended tracts into their suburban areas. During the past 24 years the tracted areas have increased so that now nearly 50 per cent of the population of the United States live in tracted areas.

In 1900, New York City was the only one of the eight tracted cities that made use of the census tract data. In 1926, Chicago and Cleveland obtained tabulations from the 1920 Census. Following 1930 these and other cities obtained special tabulations from the Bureau of the Census.

With the encouragement of this Committee the Bureau of the Census compiled and published population and housing data by census tracts for the first time following the 1940 Census. Prior to that time each city paid for the compilation, tabulation, and publication of their own data.

During 1955 a great many of the tracted areas agreed upon the combinations of the census tracts, which should be considered as including the Central Business District for the purpose of tabulating comparative CBD data resulting from the 1954 Census of Business.

The development of census tracts has not been limited to the United States. Winnipeg and Vancouver were included in the Canadian census of 1941 as census tract cities. During the following ten years census tracts were recognized in more Canadian cities, and data by tracts were published for 14 cities as a result of the 1951 Census. Without a doubt three more of the larger Canadian cities will be tracted prior to the next census of Canada.

With the tracting of all of Cleveland's Cuyahoga County following the 1930 Census, the Bureau of the Census was influenced to permit other communities to extend their tracts beyond city boundaries; and in recent years the Bureau has encouraged the tracting of entire Standard Metropolitan Areas which, in most cases, include one or more counties.

The Committee is continuing to promote interest in census tracts and the use of census tracts as a tool in the analysis of local problems of all sorts. In February, copies of the papers and reports given at the meeting in Montreal on September 13, 1954, were mailed to the members of the Committee, to the Census Tract Key Person in each tracted community, and to persons in other cities interested in tracting their communities.

Copies of the program for the New York meeting, which was held on December 30, were sent on December 5 to more than 125 persons interested in census tracts in their local communities. These persons were urged to attend the New York Census Tract Conference.

At the morning and luncheon session on December 30 in New York, papers dealing with "Putting Census Tracts to Work" and with the recent developments in the use of census tracts in various communities were presented.

A dinner meeting of the Committee on Census Enumeration Areas was held on Thursday evening, December 29. Plans for the future development of the use of census tracts in the various tracted communities were discussed, and also the type of census tract program which should be planned for the next meeting of the American Statistical Association.

HOWARD WHIPPLE GREEN, *Chairman*

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Ferdinand F. Mauser
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Dorothy W. Myers
Conrad Taeuber
Leon E. Truesdell

NEWS ABOUT MEMBERS

Robert W. Birch is now an Applied Science Representative for International Business Machines Corporation. His work is mainly concerned with the application of computers to scientific and mathematical problems.

Paul M. Blunk is now Chief, Reliability Group, Aerojet-General Corporation, at Sacramento, California.

James B. Brown, who was formerly with the Quality Control Department of Commercial Solvents Corporation, Terre Haute, Indiana, is now a statistician with the Research and Development Group of National Petro-Chemicals, Tuscola, Illinois.

Douglas G. Chapman, Associate Professor, Department of Mathematics, University of Washington, has been named as a scientific advisor to the United States delegation to the International North Pacific Fur Seal Conference. This Conference, which convened in Washington, D. C. on November 28, 1955, was set up to draft a treaty on the management and conservation of the North Pacific fur seals.

Reuben Cohen, recently with the Office of Armed Forces Information and Education, Department of Defense, has joined the research staff of Opinion Research Corporation, Princeton, New Jersey as Chief Statistician.

Lewis N. Dembitz has been appointed an Assistant Director of the Division of Research and Statistics of the Board of Governors of the Federal Reserve System. He had been serving as Assistant Director of the Division of International Finance since July 1, 1950, and has been a member of the Board's staff since 1934.

Louis P. Diamond has a new position as Assistant Engineer—Research, Office of Vice President—Construction and Maintenance, Chesapeake and Ohio Railway Company, Huntington, West Virginia. He is engaged in Operations Research work.

Sanford M. Dornbusch, formerly of the University of Washington, has joined the Department of Social Relations, Harvard University, as Assistant Professor of Sociology. He spent the past academic year, 1954-55, at the Center for Advanced Study in the Behavioral Sciences.

C. H. Edmison has transferred from the Army Audit Agency in San Francisco to the Internal Revenue Service at Boise, Idaho as Chief of the Administrative Division.

Sir Ronald Fisher, F.R.S., Arthur Balfour Professor of Genetics, Cambridge University, an Honorary Member of ASA, has been awarded the Copley Medal for contributions to developing the theory and application of statistics for making quantitative a vast field of biology.

Kenneth M. Ford is Director of Business Research for the Atlas Plywood Corporation. His activities will involve all phases of market, product and consumer research.

Luis Fernando Gutierrez T. has been appointed as Director of the Federacion Nacional De Comerciantes (Fenalco), Cundinamarca Section, and Economy Professor at La Gran Colombia University of Bogota, Colombia.

Frank J. Hanmer has been appointed Senior Research Analyst in the Operating Statistics Branch, Division of Program Statistics and Analysis, Bureau of Public Assistance, Social Security Administration.

Harold Hotelling, Professor of Mathematical Statistics at the University of North Carolina, was awarded on November 11, 1955 the degree of Doctor of Laws by the University of Chicago at the convocation in celebration of the twenty-fifth anniversary of the University's Social Science Research Building. Dr. Hotelling was cited as the "foremost contemporary contributor of quantitative methods to the social sciences, who by mathematical analysis has notably advanced our understanding of fundamental problems in economics and in statistics."

Charles E. Hawkins has been appointed to the newly established position of Legislative Reference Officer in the Office of the Commissioner, Social Security Administration.

Sidney A. Jaffe, formerly Chief of the Branch of Program Planning and Techniques, in the Division of Manpower and Employment Statistics, has been appointed Division Statistician of the Division of Prices and Cost of Living, Bureau of Labor Statistics.

Jerome B. Katz has resigned from his position as Statistician in the Office of Director of Programming, Housing Division, New York City Board of Education to take up duties as Analytical Statistician in the Budget and Analysis Branch, Office of the Comptroller, Aberdeen Proving Ground.

Walter P. Kuenstler, formerly Director of Sales Research for the Pepperell Mfg. Co., New York, has joined General Foods Corporation in White Plains, New York, as Marketing Research Associate.

John C. McKee has recently been appointed Chief Statistical Analyst for the Engineering Division of the Douglas Aircraft Company, Long Beach Division. He will take an active part in training the statistical staff in the most modern methods of aircraft statistics.

Morris Mendelson is working at the National Bureau of Economic Research on the Post War Capital Market Project.

Ida C. Merriam, who has been Assistant Director of the Division of Research and Statistics, Social Security Administration, has been appointed Director. Mrs. Merriam, who was in Thailand on a technical mission, assumed her new duties on January 30.

Richard R. Newberg has taken a position as Associate Professor at Ohio State University.

William Fielding Ogburn, Professor Emeritus of Sociology at the University of Chicago and a Past President of ASA, was awarded the degree of Doctor of Laws by the University of Chicago on November 11, 1955, at the convocation in celebration of the twenty-fifth anniversary of the University's Social Science Research Building. Dr. Ogburn was cited as a "distinguished social scientist who has contributed significantly to the growth of interdisciplinary research in the social sciences and to the development and use of rigorous methods and their application to the understanding of basic problems of our dynamic society".

William H. Peckham has joined the Caterpillar Tractor Company, East Peoria, Illinois, as a procedure analyst on problems of planning and production.

Jack N. Peterman has joined the staff of The Buchen Company, Chicago advertising agency, as Director of Psychological Research. Previously research psychologist and branch chief at the Training Aids Research Laboratory of the Air Force Personnel and Training Research Center, he will be responsible for the investigation of psychological aspects of marketing research problems.

Donald C. Riley has been elected Secretary of the Allied Social Science Associations, succeeding Samuel Weiss. This organization arranges for collaboration among the various social science associations with regard to arrangements for meetings and mutual problems.

H. E. Riley has been appointed Chief of the Division of Prices and Cost of Living of the Bureau of Labor Statistics.

John Rivoire, formerly Manager of the Division of Industrial Economics, Midwest Research Institute, Kansas City, Missouri, is now Market Research Manager for Westvaco Mineral Products Division of the Food Machinery and Chemical Corp., New York City.

Joseph Rosenbaum has joined the RAND Corporation, Santa Monica, California, as Assistant Mathematician in the System Development Division. He was formerly Research Associate in the Department of Biostatistics, Graduate School of Public Health, University of Pittsburgh.

John T. Shirer has been Budget Analyst in the Budget Branch of the Public Housing Administration, Washington, D. C., since July 1, 1955.

Eleanor Shlifer has opened a statistical agency in Los Angeles supplying temporary or consulting service in quality control and economic statistics.

George Cline Smith has been elected a Vice-President and Director of the F. W. Dodge Corporation. He was formerly Assistant Vice-President and Economist and will continue to serve as Economist in his new position.

Robert B. Steffes has transferred from the Office of Statistical Standards, Bureau of the Budget, to the Bureau of Labor Statistics as Statistical Consultant for Departmental Standards.

F. M. Wadley, formerly of the Bureau of the Census, has joined the Transportation Section of the Agricultural Marketing Service as an analytical statistician.

Dr. M. A. Teixeira de Freitas, distinguished Brazilian statistician and educator, died on February 22nd. Dr. de Freitas had been Secretary-General of the Brazilian Institute of Geography, and more recently Director of Educational and Health Statistics, Ministry of Education and Health, and a member of the National Council of Statistics, IBGE. He was a Fellow of ASA, and a member of ISI and IASI, of which he was president from 1941–1947.

Dr. Howard B. Myers, noted economist and Research Director of the Committee for Economic Development, died on March 9 at Bethesda, Maryland. Prior to joining the CED he had held various teaching and governmental positions. He did pioneer work in the planning and directing of large scale statistical and economic research programs, and laid the foundation for the present method used by the Government to measure unemployment. He was a Fellow of the ASA.

NEWS — Continued from page 4

principal statistics published by international organizations, as well as subject and country indexes. New tables in this issue relate to prices in external trade by commodity groups, wholesale prices of 51 commodities in different markets, cinemas—number and attendance, and television stations. The tables on economically active population and illiteracy, last given in the 1949–50 issue have been re-introduced. The territorial coverage of most tables has been further expanded; compared with the previous issue, there are 42 more countries in the table on telephones and 33 more in both the milk production and electric energy (capacity) tables. Following the receipt for the first time by the Statistical Office of official series from the USSR, world totals including and excluding the USSR are now shown in certain tables.

The "Statistical Yearbook 1955", which runs to 644 pages, may be purchased at $6.00 paperbound or $7.50 clothbound, from the International Documents Service, Columbia University Press, 2960 Broadway, New York 27, N. Y.

Annual Meeting of Association for Computing Machinery

The annual meeting of the Association for Computing Machinery will be held on the University of California Westwood Campus, Los Angeles, August 27–29, 1956. For information write G. W. King, Box 3251, Olympic Station, Beverly Hills, California. Papers should be submitted (abstract and four page manuscript in triplicate) by May 15 to J. P. Nash, University of Illinois, Urbana, Illinois. See the January issue of the *Journal of the Association for Computing Machinery* for further details.

Important McGRAW-HILL Books

Fundamental Statistics in Psychology and Education, Third Edition

By J. P. Guilford, University of Southern California. *McGraw-Hill Series in Psychology.* 584 pages, $6.25

The third edition of this well-known college text reflects the changing emphases in the needs for statistical methods of different kinds, and the rapid development of new, useful methods in the past five years. Exercises have been revised throughout, with answers now provided for all computational problems. A major change in this edition is the addition of new material in the area of hypothesis testing and statistical inference. *Workbooks* (Advanced and Elementary) will be available for fall classes.

A Primer of Social Statistics

By Sanford M. Dornbusch, Harvard University and Calvin F. Schmid, University of Washington. 264 pages, $4.75.

Social workers, social scientists, anyone interested in learning elementary statistics will welcome this up to date coverage of basic statistical concepts and techniques. Written with simplicity and clarity, this book is unique in that it presumes no mathematical knowledge beyond arithmetic. Appropriate mathematical information is introduced at the point where it becomes necessary. Mathematical concepts and formulas are presented simply and in such a manner as to make their significance and utility immediately apparent. Emphasis is placed on the nature of statistical reasoning, including appropriate explanations of the logic underlying various statistical concepts and techniques. There are discussions on the derivation, application, and interpretation of various statistical tools.

Psychometric Methods

By J. P. Guilford. *McGraw-Hill Series in Psychology.* New Second Edition. 604 pages, $8.50

Thoroughly revised and expanded, this new second edition presents the same comprehensive treatment of all phases of psychological measurement that distinguished the first edition. New material includes sections on the theory of psychological measurement, psychophysical theory, mathematics necessary for an understanding of psychometric methods, new psychophysical methods, principles of judgment and current major approaches to psychological-test theory. Emphasis throughout is upon the fundamental unity of all the psychological measurement methods.

Basic Statistical Concepts

By Joe K. Adams, Bryn Mawr College, 316 pages, $5.50

This new book develops some basic mathematical-logical concepts of statistics. It provides an understanding of the language used in mathematical statistics, including the language of elementary calculus. The logic of statistical inference is presented using finite populations, making it possible for the beginning student to work through the basic concepts without skipping any of the mathematics involved. Also included are the most frequently used mathematical models.

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CHAPTER NOTES

ALBANY

A joint dinner meeting with the Albany Section of the American Society for Quality Control was held on January 12th. The dinner was preceded by a problem session under the guidance of Charles Armstrong. The problem consisted in estimating the frequency of occurrence during July and August of days running 100° F or above from data given as to the monthly highs for a number of preceding years. The speaker for the evening meeting was Sutton Monro, who is with the Bell Telephone Laboratories in Allentown, Pennsylvania. Mr. Monro's subject was "Mixing Common Sense with Statistics."

The subject of the regular meeting held February 15th was "A Statistical Evaluation of the Use of the New Drug Therapies in the New York State Mental Hospitals." Dr. Henry Brill, Assistant Commissioner of the New York State Department of Mental Hygiene, was the speaker.

BOSTON

The Boston Chapter held dinner meetings on February 7th and March 1st. On February 7th Professor Charles A. Bliss of the Harvard Business School spoke on "Methods of Economic Forecasting."

On March 1st Dr. R. W. Sittler, Lincoln Laboratory, M.I.T., discussed "Some Examples of Systems Analysis." Systems Analysis is one of the three great branches of applied mathematics, dealing with interactions in linear dynamic structures containing many elements. Variables may be probabilistic in nature, e.g., queueing and renewal problems, epidemics, business organizations; or physical, e.g., electrical or mechanical vibrations.

CENTRAL INDIANA

The Chapter's January meeting was held the 13th, at the Indiana University Medical Center, Indianapolis. After an informal dinner the speaker was Dr. W. J. Youden, consultant at the National Bureau of Standards. His topic was "Making Good Measurements". His talk concerned the new types of experimental design that have been developed, largely since World War II, as a result of moving experiments into the laboratory. A major point Dr. Youden made was the use of balanced, incomplete blocks for use in running experiments by parts, when block sizes are fixed by physical circumstances, block effects are of interest, and replications few in number. Dr. Youden discussed several examples of designs developed at the Bureau of Standards.

The Chapter's February meeting was a joint meeting with the Indianapolis Chapter of the American Society for Quality Control. The meeting was held at the Indiana University Medical Center, Indianapolis. The speaker was R. L. Brickley, Manager of Statistical Control for the Semi Conductor Division of Westinghouse Electric Corporation, Pittsburgh. His topic was "How to Get Information Out of Experiments". His main point was: The objective of an experiment, coupled with initial knowledge of the problem, feasibility of certain actions and consideration of cost will lead to the design of an experiment. Excessive ingenuity can lead to experimental designs which are not of practical use.

CHICAGO

A symposium on "Chicago's Population Today and Tomorrow" was held on January 12th under the sponsorship of the Government Statisticians Committee. The speakers were Dr. Yuan Liang, Chicago Tribune Research Department, who discussed the Chicago Tribune's sample survey; Dr. Donald J. Bogue, Associate Director of the Population Research and Training Center of the University of Chicago, whose topic was Chicago's present population; and Dr. Philip Hauser, Director of the Population Research and Training Center, who spoke on projection of population estimates into the future.

The topic of the February 9th meeting was "Viewpoints on Consumer Credit in 1956". Speakers were J. Charles Partee, Economist with the Federal Reserve Bank of Chicago; Ernst A. Dauer, Director of Consumer Studies, Household Finance Corporation; and H. Arthur Charous, Economist, Sears, Roebuck and Co.

Luncheon meetings were held on February 2nd, February 16th and March 1st. The speaker at the February 2nd meeting, held jointly with the Chicago Chapter of the American Marketing Association, was Warren N. Cordell, Vice-President of A. C. Nielsen Co., whose topic was "Effective Use of *Small Samples* for Business Decisions". At the February 16th meeting Harold M. Mayer, Assistant Professor of Geography, University of Chicago and a former member of the Chicago Regional Port District Board, spoke on "Chicago: World Port". J. Stevens Stock, Vice-President of Alfred Politz Research, Inc., discussed "Continuing Research vs. One-Shot Surveys" at the March 1st meeting which was also held jointly with the Chicago Chapter of the American Marketing Association.

CONNECTICUT

The following officers were elected at the annual meeting of the chapter held on Feb. 29 at Yale University:

President: Mr. James Tobin, Associate Professor of Economics, Yale University.

Vice-President: Dr. Gordon M. Harrington, State Department of Education

Secretary-Treasurer: Mr. Royal A. Crystal, Manager, Statistical Department, Connecticut Medical Service, Inc.

HAWAII

Dr. James H. Shoemaker, Vice-President of the Bank of Hawaii, spoke at the December 7th meeting on the forthcoming publication by the Bank's Department of Business Research of a monthly *Review of Business and Economic Conditions*. A business index based on local transactions will be included as well as other business indicators and analytic commentary.

A business meeting and dinner was held on February 24th, followed by an evening program at which Dr. Paul P. Wallrabenstein spoke on "Mainland Experiences with Agricultural Statistics". Dr. Wallrabenstein, who has done extensive work in crop reporting in Ohio and West Virginia, and who has been with the Federal Crop Reporting Service in Washington since 1944, is presently at the University of Hawaii to establish Federal crop reporting for the Territory.

LOS ANGELES

A dinner meeting was held on January 19th at which the speaker was Dr. Conrad Taeuber, Assistant Director of the Bureau of the Census. Dr. Taeuber's subject was "Current Population Estimates". A demonstration of Chart-Pak was presented before and after the meeting by H. G. Daniels of Los Angeles.

At the February 23rd meeting Lloyd M. Braff, General Manager of the Los Angeles Department of Traffic, spoke on "Statistics and Traffic Control".

MONTREAL

The speaker at the December 7th meeting was Simon A. Goldberg, Assistant Dominion Statistician, who spoke on "The Organization and Activities of the Dominion Bureau of Statistics". Mr. Goldberg reviewed the history of government-collected statistics in Canada, and outlined the beginnings of D.B.S. and its present organizational set-up. The details of D.B.S. activities in the field of collection and presentation of data and of research were discussed.

On January 18th, R. B. McPherson, Economist of DuPont Company of Canada, Ltd., addressed the Chapter on the "Business Outlook". Mr. McPherson outlined the function of an economist in making business forecasts for a corpora-

tion, and pointed out the need for differentiating between fact, forecast, and opinion. He reviewed his forecast for the present year, discussing the methods used in making such predictions and commenting on several of the economic indicators employed.

The subject of the meeting on February 8th was "Electronic Data Processing Machines" and the speaker was Walter Smuk of International Business Machines Co., Ltd. Mr. Smuk reviewed briefly the development of calculators and electronic computers, and outlined the variety of equipment currently available. He explained the uses of this equipment for statistical analysis and pointed out the differences between machines for scientific computation and for the processing of large volumes of business data. An IBM film, "Electronic Data Processing Machines", was then shown to the group.

NEW YORK

The joint meeting of the Business and Economics and Statistical Techniques Divisions held on November 17th was devoted to operations research. David B. Hertz, Popular Merchandise Co., Inc., discussed some applications of operations research in industry, pointing out that operations research is particularly applicable to the problems which have a great many intangible elements and are relatively intractable to solution by a simple technique. Merrill M. Flood, Columbia University, discussed the statistical techniques of operations research. These are the same as those of any other scientific research, consisting of theory and observation or hypothesis and experiment.

On December 15th the Biostatistics Division held a meeting the subject of which was measuring the quality of medical care. Paul M. Densen, Research and Statistical Division, H.I.P., spoke on "Problems in Measuring the Quality of Medical Care", and Henry B. Makover, Central Manhattan Medical Group, H.I.P. discussed "Unmeasured Factors in the Quality of Medical Care". Odin W. Anderson, Health Information Foundation, was a discussant.

The Business and Economics Division met on January 19th to hear Howard C. Grieves, Assistant Director of the Bureau of the Census, whose subject was "Preliminary Results of the Economic Censuses".

NORTH TEXAS

The first organizational meeting of this new chapter was held on September 16th. At the October meeting John Wortham spoke on "Sales Forecasting Techniques in the Southwest". The speaker at the November meeting was Miss Nellie Barnes, whose subject was "Statistical Projection of the Texas Economy to 1975". The December meeting was devoted to a discussion of "Operations Research" by J. Worthington. John Kimble spoke on "Application of IBM to Statistical Problems" at the January meeting.

The February meeting was held jointly with the Dallas Fort Worth Chapter of the Quality Control Association. Leon Rosenberg discussed "Consumer Research" and its application at Sanger Brothers Department Store.

Attendance at the meetings has been good and interest runs high. The plan is to present diversified programs designed to appeal to everyone in the chapter.

OKLAHOMA CITY

The chapter devoted two of its monthly meetings in 1955 to the question of developing statistical standards for the profession. After a thorough discussion a vote was taken on a series of questions relating to this proposition. The members present voted against the development of something like the Ten Commandments for statisticians, but voted 20 to 2 in favor of drawing up a set of standards for procedure and techniques for gathering, compiling, analyzing and publishing statistical data. A somewhat smaller majority (15 to 7) voted in favor of illustrating such a set of standards by cases of good and bad practice. The same number also voted in favor of investigating the possibility of going as far as the American Psychological Association, Association of Electrical Engineers, etc., in establishing standards of ethics. On the last question, to consider development of educational attainment examinations for recognized or approved statisticians, a 19 to 3 favorable vote was obtained.

PHILADELPHIA

Approximately eighty members and guests of the Philadelphia Chapters of the American Marketing Association and the American Statistical Association attended a jointly sponsored afternoon-evening meeting on December 13, 1955 to discuss the Censuses of Population, Housing, Manufactures and Business. The meeting was one of a series which the Census Bureau is holding with users of Census data in order to obtain guidance in developing plans for future censuses. The Bureau of the Census was represented by: Dr. Robert W. Burgess, Director; Howard C. Grieves, Assistant Director for Economic Fields; Dr. Conrad Taeuber, Assistant Director for Demographic Fields; and Howard Brunsman, Chief, Population and Housing Division. Speaking for the local Chapters in the afternoon panel discussion were: Dr. Dorothy S. Thomas, Research Professor of Sociology and Director of the Population Redistribution Center, University of Pennsylvania, on the "Census of Population"; Harlin G. Loomer, Chief, Division of Planning Analysis, Philadelphia City Planning Commission, on the "Census of Housing"; A. J. Annechino, Atlantic Refining Company, on the "Census of Manufactures"; and Richard M. Snyder, Economist, E. I. Dupont Company, on the "Census of Business".

After each of the four Censuses had been discussed by the panel members, a lively floor discussion ensued and many revisions in and additions to the Census were proposed in the light of user needs. As could have been expected, desired additions were far more numerous than proposed revisions or deletions.

The evening dinner meeting featured an address by Dr. Burgess as well as further discussion from the floor. Richard W. Foxen, of the General Electric Company, acted as chairman of the proceedings.

The Chapter held a dinner meeting on January 20th at which the speaker was Professor Tjalling C. Koopmans, Professor of Economics at Yale University and formerly Director of Research for the Cowles Commission for Research in Economics. Professor Koopman's subject was "The Interaction of Tools and Problems in Economics".

Professor Simon Kuznets of Johns Hopkins University, a past president of the American Statistical Association, was the guest speaker at the dinner meeting held on February 17th. Professor Kuznets spoke on "Statistics and Politics in the Study of Economic Growth".

ROCHESTER

At the December 6th meeting Franklin E. Satterthwaite of Rath and Strong, Inc. addressed the chapter on "The Contribution of Modern Engineering Theory to the Advancement of Statistical Methods".

ST. LOUIS

The subject of the January 18th meeting was "Stock Averages: Boon or Bane? Their Nature, Uses, and Limitations". Elmer Lotshaw, Assistant Professor of Finance, Washington University, was the speaker.

At the February 15th meeting Norman Bowsher, Financial Economist, Federal Reserve Bank, spoke on "Consumer Credit: Its Measurement and Importance". Mr. Bowsher discussed the statistical and practical problems in measuring consumer credit and in determining whether credit is increasing too rapidly.

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CHAPTER NOTES

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STATE COLLEGE, PENNSYLVANIA

The following officers have been elected to serve until January, 1957:

President, J. B. Bartoo, Department of Mathematics.

Vice-President, Hans Panofsky, Department of Meteorology.

Secretary-Treasurer, G. E. Brandow, Department of Agricultural Economics and Rural Sociology.

VIRGINIA

A meeting was held at the Virginia Polytechnic Institute on January 20 1956. Mrs. Mavis B. Carroll, of the General Foods Corporation, read a paper on Factorial Designs in Industrial Experimentation, in which she described the reasons for the designs which were chosen in some actual experiments and the methods of analyzing the results and presenting them.

The Annual General Meeting will be held jointly with the Statistics Section of the Virginia Academy of Science in Richmond on May 12th and 13th. A program of 16 papers has been arranged, with Dr. Daniel Teichroew as the principal speaker. His topic will be "Uses of Electronic Computing Systems". The other papers include various topics in the design and analysis of experiments, quality control, distribution theory and econometries. The schedule of this meeting will gladly be sent to anyone requesting it.

WASHINGTON

The Washington Statistical Society held its annual dinner meeting on January 23rd. The Chairman of the meeting was Dr. Raymond T. Bowman, Assistant Director for Statistical Standards of the Bureau of the Budget, and the speaker was Congressman Richard Bolling of Missouri, Chairman of the Subcommittee on Economic Statistics of the Joint Committee on the Economic Report. Congressman Bolling's subject was "The Role of Statistics in Economic Policy Making". He stressed the value of statistics, described the progress that has been made thus far in adopting the recommendations of the Subcommittee on Economic Statistics, and discussed some of the remaining gaps in our system of Federal statistics.

The subject of the meeting held on February 20th was "Designs, Data and Deductions". W. J. Youden, Consultant, National Bureau of Standards, was chairman. The speakers were Herman E. Ellingson, Physicist, Acoustics Division, Naval Ordnance Laboratory, who spoke on "Statistical Experiences of a Physicist"; John B. Wachtman, Physicist, Mineral Products Division, National Bureau of Standards, whose subject was "An Application of a Novel Experimental Design to Laboratory Experiments"; and Glenn W. Brier, Chief of the Meteorological Statistics Section, Weather Bureau, who discussed "Some Applications of Statistics to Meteorology".

CONTRIBUTED PAPERS INVITED

Members of the Association and their guests are invited to submit papers for the Contributed Papers Sessions to be held at the 1956 Annual Meeting in Detroit.

One session will be devoted to papers of interest to the Business and Economic and the Social Statistics Sections. A second session will include papers of interest to the Biometrics and the Physical and Engineering Sections. Papers on Training can be submitted to either session.

The papers may be concerned with pure statistical methodology or the findings of statistical studies. They should be limited to 10 minutes of speaking time, or about five double-spaced typed sheets. Each should be accompanied by an abstract of not less than 100 words. If it is desired that the title only be read, then the paper should be so designated and only the abstract need be submitted. Final deadline for submission of papers is July 1, 1956.

Papers on Business, Economic or Social Statistics should be sent to Roy Reierson, 80 Cranberry Street, Brooklyn 1, New York. Papers on Biometrics and Physical and Engineering topics should be sent to Milton Terry, Bell Telephone Laboratories, Murray Hill, New Jersey.

Papers from statistical students and younger members of the Association are particularly invited. Members who are teachers or supervise junior personnel are urged to call this notice to the attention of their students or assistants. Copies of this notice for posting on bulletin boards can be obtained from the Secretary of the Association.